C·R·E·S®

CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

REPORT

SUMMER 1994

MAY 18 1994
SAN DIEGO ZOO LIBRARY

# A Cornerstone for a New Giant Panda Breeding Program

The giant panda, one of the most appealing of species, is destined to become extinct under its current conditions—both in the wild and in captivity—within the next 50 years.

The population in the wild numbers less than 1,000 animals, which are scattered in small, isolated populations. These populations suffer habitat loss because of logging, which has been identified by giant panda biologists as the most critical threat to the free-ranging panda population. Giant panda habitat must be secured as dedicated parks or reserves. The small reserves must then be connected via safe land "corridors" to other reserves, in order to promote gene flow between populations.

In captivity, the giant pandas number just over 100 animals. Most of these pandas are maintained in China, but several have been given as gifts of state to a number of different countries in the past. However, reproduction of the giant panda in captivity has been low, and more than two-thirds of the animals of breeding age have not reproduced. Coupled with this lack of adequate reproduction, the high death rate of both neonates (newborns) and adults has caused the captive population growth curve to indicate that the giant panda is headed for extinction.

In order to avert this trend, the scientists at CRES have been developing techniques during the last eight

*Continued on page 2*

***CRES® is operated by the Zoological Society of San Diego.***

**Cheetahs at the Park**
*Water system for cheetah facility.*
*See page 4.*

**A Rhino of Your Own**
*How you can help CRES.*
*See page 5.*

**"Barney's Alphabet Zoo" Video!**
Barney™ *and CRES as partners.*
*See page 4.*

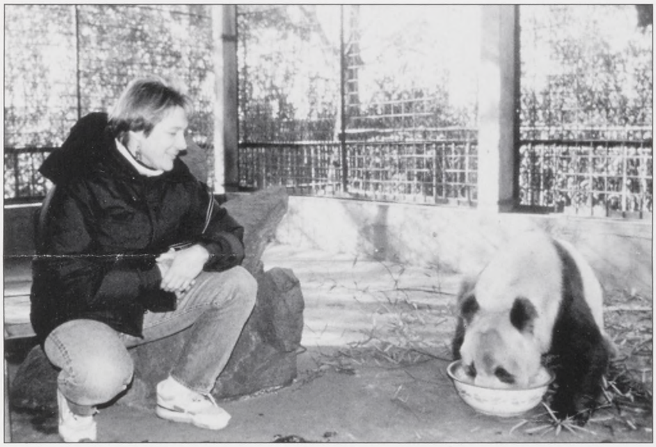
## A Cornerstone for a New Giant Panda Breeding Program

*Continued from page 1*

years to improve the reproduction potential of the panda and to analyze its genetic diversity. Once developed in our laboratories in San Diego, these techniques are then transferred to the giant panda breeding centers within China to be used actively to preserve the panda.

Reproduction in the giant panda is problematic because the female panda ovulates only once each year. In order for conception to occur, this species, which is socially solitary, must therefore be monitored in captivity with accurate timing of the day of ovulation, coupled with behavioral management.

The endocrinology division at CRES is now monitoring the ovarian cycle of the giant panda at three of the four breeding centers in China, and we are continuing to expand this program. In addition, the endocrinology division has just begun a comparative study of reproductive and adrenal hormone levels in captive and free-ranging giant pandas. The behavior division is analyzing the breeding behavior of pandas at the same three breeding centers, in an effort to improve the manner in which solitary individual animals are introduced to each other for mating. The CRES genetics division is developing techniques to permit the identification of paternity of infants and determine the genetic diversity of isolated giant panda populations.



The conservation of the free-ranging giant panda has been identified as a priority of the Chinese government. A document on the preservation of giant panda habitat has been jointly written by the Ministry of Forestry in China and World Wildlife Fund International. Specific giant panda habitats have been identified to be included as new reserves and corridors have been designed to connect these reserves. Costs for the establishment of the reserves—including removal of logging activities, establishment of poaching patrols, and reforestation—are proposed to be funded by both the Chinese government and a landmark giant panda breeding loan program to North American zoos.

The Chinese government has asked the San Diego Zoo to be the cornerstone of this new North American giant panda breeding loan program. This is a unique opportunity because the scientists at CRES will be able to use their combined expertise directly to promote reproduction and survival of the giant panda. At the same time, we will be contributing to the conservation of the giant panda in the wild.

Because the plan is to include many North American zoos as participants in this breeding loan program, we have been working with the American Zoo and Aquarium Association (AZA) to present a plan to the U.S. Department of Interior's Fish and Wildlife Service. It will explain in detail the status of the giant panda population, the need for a breeding population of giant pandas in North America, and the advantages this breeding loan program will have on the long-term survival of pandas remaining in the wild.

Our efforts to improve the status of the giant panda in captivity, as well as to conserve giant panda habitat by our participation in the breeding loan program, are major steps forward to reverse the current prediction of imminent extinction for this species.

*—Nancy Czekala-Gruber*
*CRES Endocrinologist*

C·R·E·S®
Center For Reproduction Of Endangered Species
Zoological Society of San Diego

several
bears,

etic studies
mples can be

***living***
***pandas***
***ave***
***tage.***

Thus, sam-
om hairs
ges, and on

trees or rubbing posts. This approach makes it possible to collect samples even from animals in the wild with little, if any, disturbance to their lives. By studying DNA variation among individuals that may be assayed from an analysis of hair samples, Drs. Yaping Zhang and Oliver Ryder are paving the way for noninvasive genetic studies in support of giant panda conservation.

Recently, permission was obtained from the United States government for importation of hair samples from giant pandas held in captivity in China. Preparations are being made to begin the analysis of the hairs as soon as possible, which should lead to paternity identification of giant panda offspring in captivity.

## *CRES Grants and Donors*

*The* ***Institute of Museum Services****, a federal agency providing conservation project support to the nation's museums, has made a $25,000 grant to CRES toward Dr. Roya Lahijani's research for the prevention of malignant catarrhal fever among endangered antelope, deer, and related species. The* ***General Dynamics Space Systems Division*** *has made a contribution toward student internships for CRES through the Jewell H. and James T. Bonner Summer Student Fellowship Endowment Fund.*

*The Zoological Society of San Diego gratefully acknowledges the following major donors for their recent generous gifts in support of the CRES Endowment Fund:*

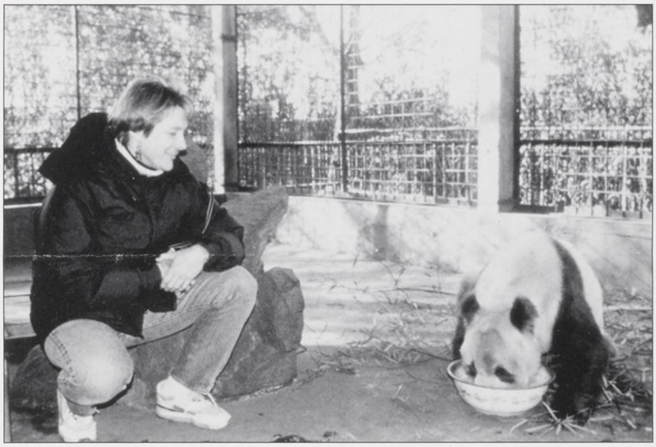
*Anonymous*
*Dru and Dave Binney*
*Mrs. Keith S. Brown*
*Betty and Bill Cooper*
*Bill Disher*
*Mr. and Mrs. W.C. Gilger*
*Martin and Enid Gleich*
*David Gold*
*Peggy and Dennis Hill*
*The Hollis Foundation*
*Charlotte and Donald B. Leiffer*
*Lottie Lundy*
*Jean and M.S. McLaughlin*
*Beverly C. Muchnic*
*Daniel Perkins*
*Lee Romney Foundation*
*Marion and Jack Shea*
*Letitia H. Swortwood*
*Robert and Joann Waldron*

## A Cornerstone for a New Giant Panda Breeding Program

*Continued from page 1*

years to improve the reproduction potential of the panda and to analyze its genetic diversity. Once developed in our laboratories in San Diego, these techniques are then transferred to the giant panda breeding centers within China to be used actively to preserve the panda.

Reproduction in the giant panda is problematic because the female panda ovulates only once each year. In order for conception to occur, this species, which is socially solitary, must therefore be monitored in captivity with accurate timing of the day of ovulation, coupled with behavioral management.



The endocrinology division at CRES is now monitoring the ovarian cycle of the giant panda at three of the four breeding centers in China, and we are continuing to expand this program. In addition, the endocrinology division has just begun a comparative study of reproductive and adrenal hormone levels in captive and free-ranging giant pandas. The behavior division is analyzing the breeding behavior of pandas at the same three breeding centers, in an effort to improve the manner in which solitary individual animals are introduced to each other for mating. The CRES genetics division is developing techniques to permit the identification of paternity of infants and determine the genetic diversity of isolated giant panda populations.

The conservation of the free-ranging giant panda has been identified as a priority of the Chinese government. A document on the preservation of giant panda habitat has been jointly written by the Ministry of Forestry in China and World Wildlife Fund International. Specific giant panda habitats have been identified to be included as new reserves and corridors have been designed to connect these reserves. Costs for the establishment of the reserves—including remov

activities, establ

poaching patrol

tion—are propo

by

gov

land

panda breeding

program to North American zoos.

The Chinese government has asked the San Diego Zoo to be the cornerstone of this new North American giant panda breeding loan program. This is a unique opportunity because the scientists at CRES will be able to use their combined expertise directly to promote reproduction and survival of the giant panda. At the same time, we will be contributing to the conservation of the giant panda in the wild.

Because the plan is to include many North American zoos as participants in this breeding loan

breeding population of giant pandas in North America, and the advantages this breeding loan program will have on the long-term survival of pandas remaining in the wild.

Our efforts to improve the status of the giant panda in captivity, as well as to conserve giant panda habitat by our participation in the breeding loan program, are major steps forward to reverse the current prediction of imminent extinction for this species.

*—Nancy Czekala-Gruber*
*CRES Endocrinologist*

---

Enclosed please find my gift in support of
the Endowment Fund for the San Diego Zoo's
Center for Reproduction of Endangered Species (CRES).
I understand my gift to the endowment will
provide revenue for ongoing conservation
and research programs in perpetuity.

**Please make checks payable to:**
**Zoological Society of San Diego/CRES**

☐ $20 ☐ $50 ☐ $100 ☐ $1,000* ☐ $____

☐ MasterCard ☐ VISA ☐ Discover Signature: ____

Account Number: ____ Expire Date: ____

Name: (Dr., Mr., Mrs., Ms.) ____

Address: ____

City: ____ State: ____ Zip: ____ Day Phone: ( ) ____

CRA

* Friends who become CRES Ambassadors at the $1,000 level will have their name inscribed on a beautiful CRES Conservation Plaque, placed at the San Diego Zoo.

Please print name exactly as you want it to appear: ____

Please indicate if this name is: ☐ in memory of ☐ in honor of a family member or loved one.

f several
, bears,

etic studies
mples can be

**living**
**pandas**
**ave**
**tage.**

Thus, sam-
om hairs
es, and on

trees or rubbing posts. This approach makes it possible to collect samples even from animals in the wild with little, if any, disturbance to their lives. By studying DNA variation among individuals that may be assayed from an analysis of hair samples, Drs. Yaping Zhang and Oliver Ryder are paving the way for noninvasive genetic studies in support of giant panda conservation.

Recently, permission was obtained from the United States government for importation of hair samples from giant pandas held in captivity in China. Preparations are being made to begin the analysis of the hairs as soon as possible, which should lead to paternity identification of giant panda offspring in captivity.

## *CRES Grants and Donors*

*The **Institute of Museum Services**, a federal agency providing conservation project support to the nation's museums, has made a $25,000 grant to CRES toward Dr. Roya Lahijani's research for the prevention of malignant catarrhal fever among endangered antelope, deer, and related species. The **General Dynamics Space Systems Division** has made a contribution toward student internships for CRES through the Jewell H. and James T. Bonner Summer Student Fellowship Endowment Fund.*

*The Zoological Society of San Diego gratefully acknowledges the following major donors for their recent generous gifts in support of the CRES Endowment Fund:*

*Anonymous*
*Dru and Dave Binney*
*Mrs. Keith S. Brown*
*Betty and Bill Cooper*
*Bill Disher*
*Mr. and Mrs. W.C. Gilger*
*Martin and Enid Gleich*
*David Gold*
*Peggy and Dennis Hill*
*The Hollis Foundation*
*Charlotte and Donald B. Leiffer*
*Lottie Lundy*
*Jean and M.S. McLaughlin*
*Beverly C. Muchnic*
*Daniel Perkins*
*Lee Romney Foundation*
*Marion and Jack Shea*
*Letitia H. Swortwood*
*Robert and Joann Waldron*

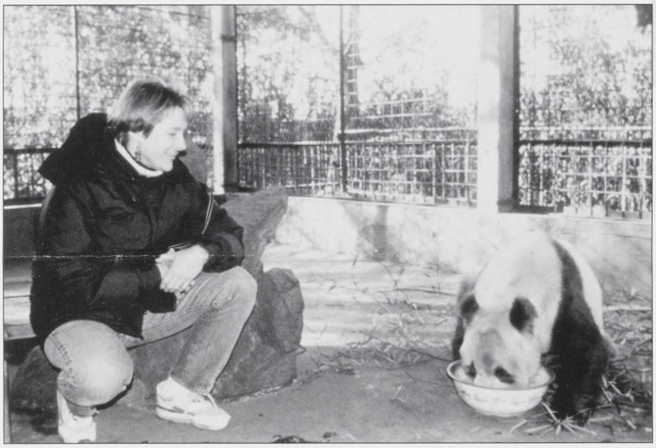
## A Cornerstone for a New Giant Panda Breeding Progr

*Continued from page 1*

years to improve the reproduction potential of the panda and to analyze its genetic diversity. Once developed in our laboratories in San Diego, these techniques are then transferred to the giant panda breeding centers within China to be used actively to preserve the panda.

Reproduction in the giant panda is problematic because the female panda ovulates only once each year. In order for conception to occur, this species, which is socially solitary, must therefore be monitored in captivity with accurate timing of the day of ovulation, coupled with behavioral management.

The endocrinology division at CRES is now monitoring the ovarian cycle of the giant panda at three of the four breeding centers in China, and we are continuing to expand this program. In addition, the endocrinology division has just begun a comparative study of reproductive and adrenal hormone levels in captive and free-ranging giant pandas. The behavior division is analyzing the breeding behavior of pandas at the same three breeding centers, in an effort to improve the manner in which solitary individual animals are introduced to each other for mating. The CRES genetics division is developing techniques to permit the identification of paternity of infants and determine the genetic diversity of isolated giant panda populations.



The conservation of the free-ranging giant panda has been identified as a priority of the Chinese government. A document on the preservation of giant panda habitat has been jointly written by the Ministry of Forestry in China and World Wildlife Fund International. Specific giant panda habitats have been identified to be included as new reserves and corridors have been designed to connect these reserves. Costs for the establishment of the reserves—including r

activities, e

poaching p

tion—are p

program to North American zoos.

The Chinese government has asked the San Diego Zoo to be the cornerstone of this new North American giant panda breeding loan program. This is a unique opportunity because the scientists at CRES will be able to use their combined expertise directly to promote reproduction and survival of the giant panda. At the same time, we will be contributing to the conservation of the giant panda in the wild.

Because the plan is to include many North American zoos as participants in this breeding loan

breeding population of giant pandas in North America, and the advantages this breeding loan program will have on the long-term survival of pandas remaining in the wild.

Our efforts to improve the status of the giant panda in captivity, as well as to conserve giant panda habitat by our participation in the breeding loan program, are major steps forward to reverse the current prediction of imminent extinction for this species.

*—Nancy Czekala-Gruber*
*CRES Endocrinologist*

---

Zoological Society of San Diego
CENTER FOR REPRODUCTION OF
ENDANGERED SPECIES
P. O. Box 271
San Diego, California 92112-9966

Place
stamp
here

## Genetics

More than 20 living captive-born giant pandas held in zoos have unknown parentage. In efforts to maximize successful reproduction, breeding centers in China have used both natural mating and artificial insemination involving multiple semen donors, with the result that paternity for a majority of captive-bred offspring is unknown. However, new genetic studies involving hair samples may help to solve this puzzle.

For several years now, CRES investigators have been utilizing hair samples for genetic studies. Although only a few cells—and a correspondingly minute amount of DNA—may be present in the follicle at the root of a hair shaft, CRES geneticists have been successful in amplifying DNA sequences from hairs of several species such as gorillas, bears, and rhinos.

An advantage of genetic studies involving hair is that samples can be obtained noninvasively. Thus, samples may be obtained from hairs shed into nests, into cages, and on trees or rubbing posts. This approach makes it possible to collect samples even from animals in the wild with little, if any, disturbance to their lives. By studying DNA variation among individuals that may be assayed from an analysis of hair samples, Drs. Yaping Zhang and Oliver Ryder are paving the way for noninvasive genetic studies in support of giant panda conservation.

**More than 20 living captive-born giant pandas held in zoos have unknown parentage.**

Recently, permission was obtained from the United States government for importation of hair samples from giant pandas held in captivity in China. Preparations are being made to begin the analysis of the hairs as soon as possible, which should lead to paternity identification of giant panda offspring in captivity.

## *CRES Grants and Donors*

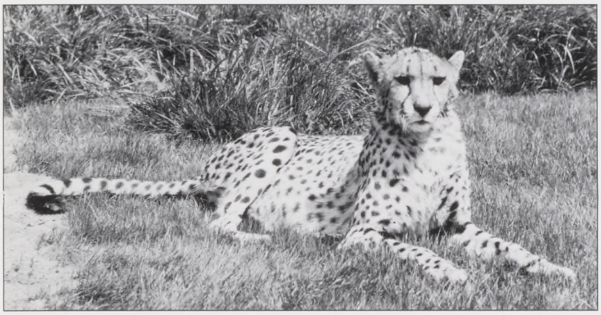
*The **Institute of Museum Services**, a federal agency providing conservation project support to the nation's museums, has made a $25,000 grant to CRES toward Dr. Roya Lahijani's research for the prevention of malignant catarrhal fever among endangered antelope, deer, and related species. The **General Dynamics Space Systems Division** has made a contribution toward student internships for CRES through the Jewell H. and James T. Bonner Summer Student Fellowship Endowment Fund.*

*The Zoological Society of San Diego gratefully acknowledges the following major donors for their recent generous gifts in support of the CRES Endowment Fund:*

*Anonymous*
*Dru and Dave Binney*
*Mrs. Keith S. Brown*
*Betty and Bill Cooper*
*Bill Disher*
*Mr. and Mrs. W.C. Gilger*
*Martin and Enid Gleich*
*David Gold*
*Peggy and Dennis Hill*
*The Hollis Foundation*
*Charlotte and Donald B. Leiffer*
*Lottie Lundy*
*Jean and M.S. McLaughlin*
*Beverly C. Muchnic*
*Daniel Perkins*
*Lee Romney Foundation*
*Marion and Jack Shea*
*Letitia H. Swortwood*
*Robert and Joann Waldron*

# 1994 CRES "Wish List"

When asked what the various CRES divisions need in the way of equipment, CRES Director Dr. Werner Heuschele always has a few dozen items that he describes as "top priority"! Whether the gift is large or small, it will be put to good use by CRES staff on the following "wish list":



- Water system for cheetah facility at Wild Animal Park: second well and water pump to relieve existing well and for emergency use, $10,000
- Micromedic work station for endocrinology lab, to replace existing micromedic that is nonfunctional, $30,000
- Semi-dry blot transfer system for DNA analysis by infectious diseases staff, $655
- Cleansphere sterile hood: a portable hood that would give reproductive physiology a sterile hood without structural modification of the lab, $1,700
- Nikon Optiphot photo microscope with objectives, for chromosomal studies, $12,000
- Liquid nitrogen shippers: two shippers for endocrinology division to transport biological samples by air, such as those used for gorilla and giant panda studies, $2,000
- Power supply source: Fisher FB 600 power supply source for DNA sequencing experiments for koala retrovirus, hepadnavirus, and cheetah FIV for virology lab, $1,800
- Binocular microscope: Olympus BH2 model with photographic attachments of Olympus PM-10AD to be used in routine work , $10,000
- Frozen Zoo inventory: IBM PC 486 hard drive, HP Laserjet, and Freezerworks software for Frozen Zoo collection, to catalog inventory by cytogenetics lab, $2,500
- DNA sequencing gel for cloned DNA from viruses affecting koalas, cheetahs, and gorillas, $1,000
- Mini electrophoresis and trans-blotting apparatus for protein analysis by infectious diseases staff, $935
- Laptop computer: Mac/Apple compatible word processor for behavior staff use when working out of the office, $3,000
- $CO_2$ incubator: Heraeus incubator to replace failing 15-year-old instrument in cytogenetics lab, $13,500
- Nikon inverted microscope with Nomarski optics for use in daily observation of long-term cultures in reproductive physiology, $15,000
- Refrigerated centrifuge to replace nonfunctional centrifuge for endocrinology routine lab work and radioactive iodine work, $9,000
- Video projector: Panasonic PT-30L, VHS recording deck to be used for training observers, testing reliability of results, and presentation of edited tapes for scientific and professional use, $6,000
- Video low-light cameras: three video cameras needed by reproductive physiology for dusk-to-dawn monitor of koala activity, $3,000
- Microcentrifuge: Brinkman 5415L Eppendorf needed for integral DNA study done in molecular genetics and to be used daily as a backup for other laboratories, $2,200
- Incubator/shaker: New Brunswick Model G24 used for cloning DNA and for Southern blotting, with constant use in molecular genetics, $4,760
- Macintosh Quadra 610 computer with CD-ROM drive for DNA sequence analysis by infectious diseases staff, $2,515
- Magnetic stir plate with infrared heat source for preparation of solutions and buffers by infectious diseases staff, $908

- Corning pH meter to replace outdated and inaccurate unit, $1,392
- Hoefer Scientific motorized rocker platform for molecular biology procedures in the infectious diseases lab, $715
- Macintosh computers: five Macintosh Quadra 610 computers with internal CD-ROM drives and 230MG memory for use by pathologists, $15,000

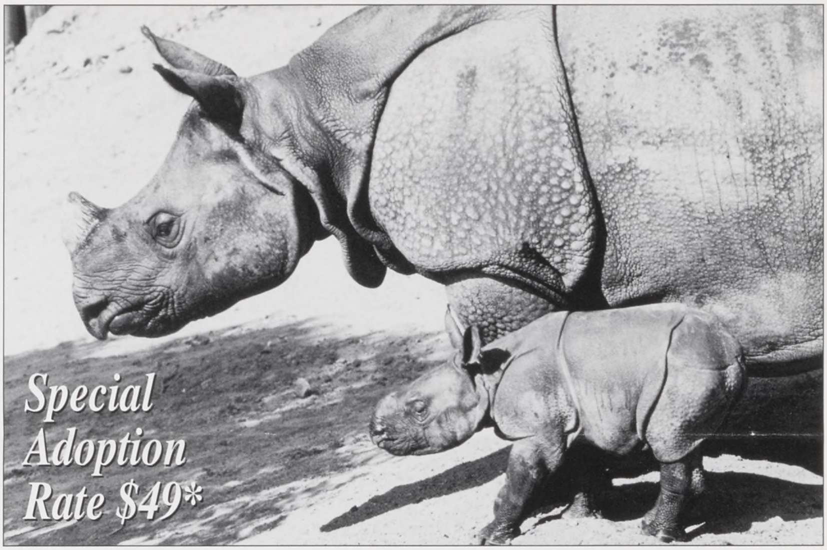
## *Barney™ and CRES Make "Stu-u-upendous" Partners!*

*Barney™, the lovable purple dinosaur of public television's children's series* Barney & Friends™, *now stars in a new home video, "Barney's Alphabet Zoo." In the 30-minute presentation, Barney and his classroom friends—Shawn, Julie, Tina, Derek, and two guest characters—visit an imaginary zoo. "Barney's Alphabet Zoo" is packaged with a colorful growth chart for children and an alphabet list in which letters are creatively depicted by photographs and information on endangered species.*

*In connection with the video's release, The Lyons Group, producers of the Emmy Award-nominated children's series, will make a donation to CRES and will also donate a portion of the proceeds generated by the sale of "Barney's Alphabet Zoo." This contribution to CRES will help the center's work to preserve the world's endangered wildlife while providing quality educational entertainment for children ages 1 through 8.*

© 1993 The Lyons Group Photo by Mark Perlstein

## Adopt a Rhino!



Looking for a fun and unusual gift to tell Dad he's special on his big day? Don't be caught with the rest of the herd. Instead of ties, cologne, or shirts, give him a gift that he'll be wild about!

This Father's Day, we're offering a special Adopt-A-Rhino package. For only $49*, you can give him a gift he will always remember:

- **a handsome key ring with the CRES logo to satisfy his need for a traditional gift**
- **an attractive, personalized adoption certificate**
- **a special card to announce your gift adoption.**

And, there is the knowledge that your contribution will help CRES staff continue their research and conservation efforts to save these rare and precious animals. Between them, the San Diego Zoo and the Wild Animal Park currently exhibit all of the living rhino species (with the exception of the critically endangered Javan rhinoceros). Comparative genetic and endocrine studies at CRES of rhinoceros species and subspecies have complemented the Society's notable successes in the reproduction of southern white and Indian rhinos. New steps are also being taken to improve captive breeding for the northern white, southern black, and Sumatran rhinoceroses.

It's easy and fun to adopt! Fill out the adoption form in this issue of *CRES Report* and mail it, along with your check, to the address provided. For more information or to charge your adoption, please call (619) 557-3974, weekdays from 9 A.M. to 4 P.M.

NOTE: Naturally, your adopted rhino will remain at the Zoo or the Wild Animal Park in the care of our professional staff. Please be aware that the lives of animals for adoption are subject to unavoidable changes. For that reason, adoptions are offered by species only, not by individual animal.

* Special adoption rate good until Wednesday, June 8, 1994.

### *Celebrate with Jurassic Ark!*

*The countdown has begun—less than 120 days remain before Saturday evening, September 24, 1994, when party animals unite at the San Diego Zoo to kick up their heels at the 14th annual Celebration for the Critters, themed "Jurassic Ark." At this year's party, guests will enjoy a multitude of festivities, foods and drinks, and furry friends while dancing to one of southern California's most popular bands, The Heroes. Save the date in your calendar and look for more details in the next issue. To be placed on the invitation mailing list, call the Zoo at (619) 557-3974—don't miss the boat for this event!*

## ANIMAL ADOPTION APPLICATION

☐ **YES,** I want to adopt a Rhino as a gift for:

Name(s) ______________________________

Address ______________________________

City ____________________ State ____ Zip ________

Please sign the special card announcing my gift adoption as follows:

______________________________

Name(s) ______________________________

Address ______________________________

City ____________________ State ____ Zip ________

Phone (day) ______________ (evening) ______________

Member Number ______________________________

☐ Also, please enter my own adoption for a Rhino at the special rate of $49 for one year.

Please make checks payable to the Zoological Society of San Diego and mail to:

**The Zoological Society of San Diego**
Adopt-An-Animal Program
P.O. Box 271
San Diego, CA 92112

Or, to charge your Adoption by telephone, call (619) 557-3974 between 8:30 A.M. and 4 P.M., Monday through Friday. Orders must reach the San Diego Zoo by June 8 to ensure delivery by Father's Day.

☐ Please check here if you'd like more information about our Adopt-An-Animal Program

(APC4)

# Trust in the Future

Do you have appreciated securities that have perhaps peaked in value and are producing rather low dividends? You would like to sell them but shudder at the thought of the capital gains liability? Similarly, do you have highly appreciated real estate holdings that you would prefer to sell but haven't because of the amount that capital gains taxes would take out of the proceeds?

If so, you might want to consider a charitable trust arrangement. You could transfer the appreciated property into such a trust; it could be sold out of the trust (which operates tax-free) without capital gains taxation; and the entire proceeds could be reinvested to produce income for you and your spouse. Then, the remaining principal would become a significant contribution to CRES and/or the Zoological Society. Plus, you would be eligible immediately for charitable gift income tax deductions (both federal and state) for a portion of the value of the assets transferred into the trust, and your estate tax liability could be reduced or eliminated.

If you'd like to learn more about this subject, the Society has a brochure, "Tax-advantaged Life Income and Estate Enhancement Plans," that's yours for the asking. To receive a copy, just telephone Planned Giving Director Patrick O'Reiley at (619) 685-3215.

CRES
REPORT
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

**EDITOR:**
Mary Sekulovich

**EDITORIAL ASSISTANT:**
Betsy Sanders

**SPECIAL THANKS TO CRES REPORT CONTRIBUTORS:**
Nancy Czekala-Gruber
Werner Heuschele, Ph.D.
Judy Kinsell
Joanne Leidenberger
Patrick O'Reiley
Amy Parrott
Oliver Ryder, Ph.D.

**GRAPHIC DESIGN:**
Warner Design Associates, Inc.

**PHOTOGRAPHS/ ILLUSTRATIONS BY:**
Nancy Czekala-Gruber
Ron Gordon Garrison
Ken Kelley
Mark Perlstein

SAN DIEGO ZOO · SAN DIEGO WILD ANIMAL PARK ·

© Zoological Society of San Diego, 1994.
All rights reserved.

Printed on recycled paper.

Zoological Society of San Diego
Development Department
Post Office Box 551
San Diego, California 92112

CRES
REPORT
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

Non-Profit Organization
U.S. Postage
PAID
San Diego, California
Permit Number 410

```
******  ***  CAR-RT-SORT **B900
690800K  DS   0000
ZOO LIBRARY
PO BOX 551
SAN DIEGO CA   92112
```